

ON *RAETOMYA*, A NEW GENUS OF PELECYPODA, FROM THE
TERTIARY ROCKS OF EGYPT AND SOUTHERN NIGERIA.

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PLATE I.

THE shell described in this paper was originally found in the Upper Mokattam Beds (= Eocene) of Egypt, while further examples of the same have now been identified from Southern Nigerian rocks contained in collections made by Dr. A. E. Kitson, F.G.S., Principal of the Mineral Survey of the Gold Coast, and Sir J. Eaglesome, C.M.G., both of whom have presented their specimens to the Geological Department of the British Museum, Dr. Kitson's having been presented in association with W. Heward Bell, Esq., F.G.S.

A preliminary collection of fossils from the same locality, but containing no remains of the shell in question, was obtained and also presented to that institution by Sir F. Lugard, G.C.M.G. The fossils acquired in this manner between the years 1915 and 1917 were discovered in the same section, which is situated on the Port Harcourt Railway, Ombialla District of Southern Nigeria. They belong chiefly to the invertebrate groups, especially the Mollusca, although relics of some important vertebrates consisting of a zeuglodont, bird and chelonian remains, fishes, etc., are also represented, which have been already partially described by Dr. A. S. Woodward,² F.R.S., and Dr. C. W. Andrews,³ F.R.S., who are both of opinion that they belong to an Eocene age, and probably the older part of that formation as suggested by the second author, on account of some particular characters shown by the zeuglodont remains.

Until further studies are completed on the molluscan fauna it is considered premature to offer too definite a statement as to the geological age of the deposits, although, in the meantime, it may be mentioned that they present a very similar lithological facies which would suggest their reference to one distinct series of beds, and which from their fauna would indicate an estuarine origin. The matrix is a grey and greenish-grey calcareous sandstone of variable degrees of hardness, sometimes assuming the density and appearance of flint which frequently forms the infilling material of the Pelecypod valves, thus rendering it difficult for the development of internal characters. With regard to the specific form, *Lovellia schweinfurthi*, which constitutes the type of the new genus described in this paper, it is only right to state that it fully supports the Eocene age theory for the Nigerian beds as hitherto recognized, on account of its occurrence in the Upper Mokattam deposits of Egypt, which belong to the Lutetian or Middle stage of the European

¹ Published by permission of the Trustees of the British Museum.

² Abstracts Proc. Geol. Soc. London, No. 989, 1916, p. 51.

³ Abstracts Proc. Zool. Soc. London, No. 158, 1916, p. 30, and Proc. Zool. Soc. London, 1916, pp. 519-24, figs. 1-4.

Eocene. In concluding this preliminary statement I wish to thank my friend Mr. B. B. Woodward, F.L.S., for some valuable suggestions during the prosecution of my studies on this shell.

RAETOMYA, gen. nov.

Diagnosis. — Shell inequilateral, obliquely gibbose, thin, concentrically and irregularly plicate, striated and wrinkled; dorsal areas not defined; anterior side deep, long, oblique, depresso-concave, posterior region short,¹ marginally compressed, reflected, slightly gaping; umbonal areas arched, summits opisthogyrous, incurved, oblique, laterally approximate but distant with age, the right elevated above the left; left valve with strong hinge-plate furnished with a horizontally projecting triangular chondrophore marginally grooved each side, deeply excavated anteriorly and striate within, succeeded by an antero-marginal sulcus, the posterior side having a wider marginal sulcus to receive the laminar tooth of the other valve; right valve provided with a shallow oval chondrophore set back in the sub-umbonal cavity, obliquely ridged posteriorly to connect with the postero-lateral groove of the left chondrophore, followed by a narrow sulcus, a posterior laminar tooth, and a widely depressed dorsal furrow; cardinal teeth absent in both valves; pallial impression widely indented by a nearly circular sinus; adductor scars unequal, posterior more or less normal, anterior narrow and elongate.

Type.—*Lovellia schweinfurthi*, Mayer-Eymar, from the Eocene (Upper Mokattam Beds) of Egypt.

Remarks.—The new shell agrees with the mactroid genus *Raeta*,² in most external characters, but differs internally by possessing: (1) dissimilar chondrophores, the left being triangular and projecting outwards, while the right is triangularly ovate, vertical, and well within the sub-umbonal region; (2) no cardinal teeth; (3) a large rounded pallial sinus. The chief external distinction concerns the summits or umbones, which instead of being opposite each other and nearly touching as in *Raeta* are laterally approximate but becoming more or less distant with age, that of the right valve being always in front of the other and rather more elevated, such as is observable in *Corbula gallica*, *C. exarata*, etc., from the European Eocene deposits. In its projecting character the left chondrophore resembles that present in *Mya*, but instead of merging with the postero-dorsal margin as in that genus it radiates outwards, with the other extended elements of the hinge-plate, from a point immediately beneath the umbo. A similarly projecting chondrophore is also apparent in members of the Corbulidæ, otherwise such shells as well as *Mya* are quite distinct from the present genus.

In *Raeta* the chondrophores are of similar construction and

¹ In this respect resembling the genera *Raeta*, *Nucula*, *Pisidium*, etc.

² According to Dr. Dall the true systematic position of *Raeta* is still uncertain, since its soft parts are unknown: Trans. Wagner Free Inst. Sci. Philadelphia, vol. iii, pt. iv, 1898, p. 907.

position in both valves; it has, moreover, cardinal teeth, and a siphonal inflection which is deep, angulate, and sloping downwards from the posterior adductor scar, being nearly parallel with the ventral margin. The adductor scar impressions are of the same design as those of the African shell, while the umbones occupy a more approximate position and are on the same plane.

The new shell has similar dorso-marginal sulci as that of *Raeta*, which it is considered would be for the reception of ligament and therefore *amphidetic*, as expressed in Neumayr's¹ terminology, as opposed to *opisthodetic*, when the ligament is entirely behind the umbones.

Again, there are no paired laminae to receive the lateral teeth as in the genus *Maetra*; these are also absent in *Raeta*. These and the other distinctions already referred to I consider of sufficient importance for regarding *Raetomya* under the new family designation of Raetomyidae. In like manner I would suggest that *Raeta*, from its differences to *Maetra*, in contour, its unequal adductor scars, and the possession of a large angulate pallial sinus, should be placed under the family name of Raetidae instead of Maetridae.

Dr. Dall,² among other investigators, has largely increased our knowledge on the morphology of the Pelecypod hinge, his earlier studies of the subject having been published in our Society's Proceedings as a preliminary thesis to more extended observations contained in his great memoir on *The Tertiary Fauna of Florida*.

In these works the true "ligament" is regarded as external, while the name "resilium" is given to the "relatively or actually internal bond between the dorsal margins of the valves" which by older authors had been termed "internal cartilage" or ligament, its function being that of separating the valves by "expansional elasticity". Dr. Dall notes the well-recognized difference in the composition of these substances, the ligament proper being of a horny nature and semi-translucent, whereas the resilium is lamellar or composed of parallel fibres, which give a pearly sheen to its broken surface. Such structures are, however, rarely seen in the fossil state, the palæontologist having only calcareous material to guide him, so that the hard chondrophore plates of the present shell between which the resilium formerly resided add greatly to its features of interest.

The genus *Lovellia* was founded by Mayer-Eymar³ on *Lutraria canaliculata* of Say⁴ belonging to the recent fauna of the North Atlantic, which itself was the type of Gray's genus *Raeta*⁵; but objecting to what he termed "noms barbares" Mayer-Eymar set

¹ Denkschr. k. Akad. Wiss. Wien, vol. lviii, 1891, p. 711.

² Proc. Malac. Soc. London, vol. i, 1893, pp. 203-13, and Trans. Wagner Free Inst. Sci. Philadelphia, vol. iii, pts. iii-v, 1895-1900.

³ Vierteljahrsh. Nat. Ges. Zürich, vol. xii, 1867, pp. 275, 286.

⁴ Journ. Acad. Nat. Sci. Philadelphia, vol. ii, pt. ii, 1822, p. 311.

⁵ Ann. Mag. Nat. Hist., ser. 11, vol. xi, 1853, p. 43. The origin of the name *Raeta* is unknown; it was probably founded in honour of Sir John Rae, the Arctic traveller.

aside all rules of nomenclature and substituted *Lovellia* for the older name of *Raeta*, a method, needless to say, which was subsequently ignored by all conchologists.

At the time of description this author characterized a fossil form of *Lovellia* under the name of *L. consobrina*, which had been discovered in the Miocene (Helvetian) of Switzerland. Although no dental information was given, he noted the condition of the pallial sinus as *sinu pallii depresso profundo*, which in connexion with the shell's contour enabled him to recognize its close affinity to Say's *Lutraria canaliculata*, and therefore it should have been designated *Raeta*.

Further forms of *Raeta* include *R. gibbosa*, Gabb,¹ from the Upper Tertiaries (= Pliocene of Grzybowski²) of Northern Peru, and Conrad's³ *R. alta* (= *erecta*, Conrad) from the United States Miocene, as also *R. rutimeyeri* of Mayer-Eymar,⁴ from the Swiss Eocene (Bartonian), all of which records furnish evidence that that genus originated in Eocene times, and thence existed through the later Tertiary epoch on to the seas of the present day. So far as is known the new genus *Raetomya* is restricted to the African Eocene deposits, having been first found in Egypt and now in Southern Nigeria.

Family RAETOMYIDÆ.

RAETOMYA SCHWEINFURTHI (Mayer-Eymar).

Lovellia schweinfurthi, Mayer-Eymar, Journ. de Conch., ser. III, vol. xxvii, 1887, pp. 320-2, pl. xi, fig. 6.

Raeta schweinfurthi, Oppenheim, Palæontographica, vol. xxx, pt. iii, 1906, pp. 190, 191, pl. xix, fig. 1, text-fig. 17.

The Nigerian specimens referred to this species, hitherto only known from the Egyptian Eocene, vary considerably in size, the smallest showing a length and height respectively of 25 and 20 mm., while one of maximum size, a natural cast with united and closed valves, measures 113 by 75 mm.; the dimensions of the type being 65 by 54 mm.

The chief features of interest of this Pelecypod are the very inæquilateral and obliquely gibbose valves; the thin test with its sculpture of more or less regular concentric ridges; the narrow, elevated umbonal regions and their laterally approximate incurved beaks; the possession of an elongate, depressed, anterior end region, slightly concave above and rounded at extremity, while the posterior side is short, wide, marginally compressed, reflected, and slightly gaping; pallial sinus widely arcuate; hinge-plate small with an anterior lamellar tooth parallel to the margin, as well as an oblique and strongly lamellar posterior tooth; no cardinal teeth referred to.

¹ American Journ. Conch., vol. v, 1869, p. 30, and Journ. Acad. Nat. Sci. Philadelphia, N.S., vol. viii, pt. iii, 1877, pl. xxxv, fig. 8, p. 333.

² Neues Jahrb. Beil.-Band, vol. xii, 1899, p. 640.

³ Appendix to Kerr's Rept. Geol. Surv. North Carolina, vol. i, 1875, p. 19, pl. iii, fig. 3.

⁴ Beitr. Geol. Karte Schweiz, vol. xxiv, pt. ii, 1887, p. 44, pl. iii, fig. 18.

These characters, mostly mentioned in the original account, are mainly of external interest, very little apparently being known as to those affecting the interior of the valves. The new and better preserved material from Southern Nigeria fortunately supplies some important details of internal structure which contribute to the value of the species, as well as suggesting its recognition as the type of a new genus; the emended specific characters may be set out as follows:—

Umbonal region well elevated and arched; summits resting on the shell margin, opisthogyrous, laterally approximate but divided in age, that of the right valve always slightly raised above the other. *Left valve* with a strong hinge-plate, having all its elements coalescent and radiating from beneath the umbonal region, which embrace:—a horizontally projecting chondrophore of elongate triangular shape and slightly concave surface, bordered by a posterior groove, and followed by a steep, oblique, posterior side which forms part of a wide and deep dorso-marginal sulcus, which probably received the ligament as well as the postero-lamellar tooth of the opposing valve. The chondrophore surface is covered with minute and closely-set concentric striations crossed by radial riblets, and bordering three-fourths of its anterior side (which is longest) is a narrowly elongate, rounded, funnel-shaped cavity marked with fine concentric and radial striations, which is regarded as the receptacle for the anterior part of the resilium. This cavity bears an antero-marginal ridge which may probably represent the so-called anterior lamellar tooth of the original description of the species; then follows the dorso-anterior marginal sulcus which holds the ligament. The basal or underneath surface of the hinge-plate is quite smooth, more or less bulbous, and furrowed. *Right valve* with a slightly excavated, triangularly-oval chondrophore, vertically situated, and merged in the sub-umbonal region, its surface similarly ornamented to that of the other chondrophore, although smoother and less obvious. The posterior border of this cavity is obliquely and roundly ridged to fit the postero-lateral groove of the left chondrophore, this being followed by an oblique sulcus and a prominently oblique, postero-lamellar tooth, to which succeeds a wide and flattened internal dorsal margin. Neither of the valves exhibits any indication of cardinal teeth.

The pallial impression as seen on internal casts shows a large and nearly circular sinus, an adult specimen measuring 85 mm. in length giving the dimensions of this sinus as 25 by 28 mm. in vertical and longitudinal diameters respectively.

The adductor scar impressions are of very unequal position and shape, the posterior being of moderate size, oblong-pyriform, concentrically striated, and well above the middle of the shell margin, while the anterior is narrowly elongate, extending to nearly the antero-ventral curvature of the valves, as in *Raeta*.

The sculpture consists of rounded plications and furrows marked with extremely fine concentric interlineations, together with obscure microscopical radial striations which enter into the texture of the

shell; the surface is also wrinkled, especially posteriorly, caused in all probability by a periostracum which must have originally covered the valves as in *Raeta*. Sometimes the plications are irregular, and occasionally they bifurcate midway across the valve, terminating singly in the posterior region, when they become more distant and consequently fewer.

Smallest example. Largest example.

Dimensions.

	mm.	mm.
Length	25	113
Height	20	75
Diameter (closed valves)	20	60

Distribution.—The Upper Lutetian beds of Egypt = Eocene formation = Upper Parisian of Europe and the Upper Mokattam deposits of Egypt.

Occurrence.—Cuttings Nos. 1, 5, 6, 10.

Collectors.—Sir John Eaglesome and Dr. Kitson.

EXPLANATION OF PLATE I.

All figures are photographed natural size with the exception of Fig. 3, which is enlarged by about one-fifth.

RAETOMYA SCHWEINFURTHI (Mayer-Eymar).

- FIG. 1.—Copy of Mayer-Eymar's original figure of the type from the Eocene of Egypt. The remaining figures represent specimens from Southern Nigeria.
- „ 2.—Left lateral view of a pair of closed valves of medium size.
- „ 3.—Dorsal view of same specimen showing the depresso-concave anterior end, the laterally approximate umbones, and the posterior gape. Enlarged one-fifth.
- „ 4.—Right lateral aspect of specimen consisting of a pair of valves of larger size than Fig. 2, showing good testiferous structure and the bifurcation of the costæ in the central part of the shell.
- „ 5.—Dorsal portion of an adult example exhibiting the separation of the umbones. Note that the right-hand side of this figure is posterior.
- „ 6.—Hinge aspect of the smallest example found, representing a left valve with the outwardly projecting chondrophore.
- „ 7.—A disconnected hinge region of a left valve belonging to a moderately large specimen, showing the triangular chondrophore plate with the long funnel-shaped cavity in front, which is supposed to have held the anterior portion of the resilium. The black bases of Figs. 7 and 8 represent the hard flinty matrix which fills the remainder of the valves.
- „ 8.—The opposing hinge of same specimen, showing a differently constituted chondrophore, and which is vertically disposed in the sub-umbonal cavity.
- „ 9.—The upper surface of an isolated chondrophore plate, showing its coalescent elements, and which must have belonged to a very large example.
- „ 10.—Basal surface of same specimen, more or less bulbous and furrowed, and quite smooth.
- „ 11.—Portion of a large internal cast with united valves, showing the postero-lateral surface of the left valve with its extensive and rounded pallial sinus.